Draft
Response Action Sampling and Analysis Plan
for
Libby Asbestos Site
Libby, Montana

August 2003

Contract No. DTRS57-99-D-00017
Task Order No. C0025

Prepared for:

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Acronyms

AHERA	Asbestos Hazard Emergency Response Act
BZ	Breathing Zone
BGS	below ground influence
CAR	Corrective Action Request
CDM	CDM Federal Programs Corporation
CSS	contaminant screening study
DQOs	data quality objectives
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FSP	field sampling plan
Grace	W.R. Grace Company
HASP	health and safety plan
IDL	instrument detection limit
L	liter(s)
LA	Libby amphibole
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MS/MSD	matrix spike/matrix spike duplicate
NIOSH	National Institute of Occupational Safety and Health
NPE	negative pressure enclosure
OSHA	Occupational Safety and Health Administration
OU	operable unit
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCM	phased contrast microscopy
PLM	polarized light microscopy
PM	project manager
PPE	personal protective equipment
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RASAP	response action sampling and analysis plan
RAWP	response action work plan
RPD	relative percent difference
RPM	remedial project manager
SOP	standard operating procedure
TEM	transmission electron microscopy
VCI	vermiculite-containing asbestos
Volpe	John A. Volpe National Transportation Systems Center
Zonolite	Universal Zonolite Installation Company
+/-	plus or minus
%	percent
°C	degrees Celsius

Section 1
Introduction

This document serves as the response action sampling and analysis plan (RASAP) for the cleanup efforts as part of the draft response action work plan (RAWP) for the Libby Asbestos Site Operable Unit (OU) 4. This RASAP outlines the sampling and analysis to be conducted by CDM Federal Programs Corporation (CDM) and John A. Volpe National Transportation Systems Center (Volpe) personnel during cleanup of contaminated soil, vermiculite-containing insulation (VCI), and interior cleaning at the site.

This section provides a general explanation and a description of the organization of this draft RASAP.

The cleanup activities being completed at the Libby Asbestos Site include the removal of VCI, contaminated soil, and contaminated dust from residential, commercial, and industrial properties. The VCI encountered in the structures is typically found in attics where residents placed it for insulating the structure. It is sometimes encountered in exterior walls for the same reason, and sometimes in interior and exterior walls because it fell through openings at the top of the walls from the attic. The contaminated soil encountered at the properties was due to vermiculite placed there for a variety of reasons, including amending of soil in flowerbeds and gardens, leveling of low spots, and backfilling of utilities. It also may have been spread in yards from other sources. Contaminated dust encountered in the structures is due to a variety of reasons, including VCI leaking into the living spaces from the attic or walls and vermiculite tracked in from the outdoor source locations discussed above. The approach to the actual cleanup of these media is found in the text of the RAWP located in the main body of this document.

During cleanup of the properties, sampling and analysis is conducted to ensure the source material is removed to the cleanup criteria and ensure the health and safety of the workers at the site and the public in the vicinity of the site. This includes sampling and analysis following removal of VCI and contaminated dust for clearance of the areas being cleaned; following removal of contaminated soils to confirm that the contamination is removed from the excavation area; and during the removal of VCI and contaminated soil to ensure safety of the workers and the public is maintained throughout the cleanup.

This RASAP outlines the field sampling plan (FSP) and quality assurance project plan (QAPP) as they pertain to sampling completed during and after soil excavation, VCI removal, and interior cleaning. The purpose of this RASAP is to describe the sampling objectives, locations, measurement methods, and the quality assurance (QA) requirements for sampling of the soil and air during cleanup efforts. The RASAP is organized as follows:

Section 1 - Introduction

Section 2 - Site Background

Part I: Field Sampling Plan

Section 3 - Sampling Strategy, Locations, and Rationale

Section 4 - Field Activity Methods and Procedures

Part II: Quality Assurance Project Plan

Section 5 - Project Management

Section 6 - Measurement and Data Acquisition

Section 7 - Assessment and Oversight

Section 8 - Data Validation and Usability

Section 9 - References

1.1 Objectives

This section defines objectives of the soil and air confirmation, air monitoring, and breathing zone sampling and analysis, and the intended use of the data. The primary objective of these efforts is to determine the presence of Libby amphibole (LA) during and after soil excavation and VCI removal at the properties identified in the contaminant screening study (CSS) and remedial investigation RI, for the Libby Asbestos site OU4.

The specific objectives are:

- Sampling after removal - final confirmation (clearance) air and confirmation soil sampling to ensure what remains meets cleanup standards as defined by EPA and listed in the draft RAWP

- Sampling during removal - stationary air monitoring sampling to ensure that excavation is not spreading asbestos into air

- Sampling throughout excavation activities - breathing zone (BZ) air sampling, a health and safety measure, to ensure workers are not being exposed to asbestos

Sampling will be ongoing for the duration of the cleanup activities at the site, which are anticipated to last until 2007.

Samples will be analyzed by the following methods:

- Soil - PLM. Bulk Asbestos (NIOSH 9002)
- Air - PCM. Asbestos and Other Fibers (NIOSH 7400)
- Air - Interim Transmission Electron Microscopy Analytical Methods (AHERA TEM)

1.2 Project Schedule and Deliverables

The results of the draft RASAP will be placed in the property cleanup files at the office in Libby and maintained by CDM/Volpe/EPA. Other project deliverables and schedules are discussed in the draft RAWP for this work (The main body of this document).

Part I: Field Sampling Plan

Section 2
Site Background

This section describes the site location and the history.

2.1 Site Location

The Libby asbestos site is located within Sections 3 and 10, T30N, R31W of the Libby Quadrangle in Lincoln County, Montana (Figure 1-1 in the RAWP). The site includes homes and other businesses, which may have become contaminated with asbestos fibers as a result of the vermiculite mining and processing conducted in and around the City of Libby (Figure 1-2 in the RAWP).

2.2 Site History

Vermiculite was discovered 7 miles northeast of Libby, Montana in 1881 by gold miners. In the early 1920s, Mr. Edward Alley began initial mining operations of this vermiculite ore body. Full-scale operations began later that decade under the name of the Universal Zonolite Insulation Company (Zonolite). This vermiculite ore body contains amphibole asbestos fibers with compositions including tremolite, actinolite, richterite, and winchite (herein referred to as LA) as defined by B.E. Leake, et al. (1997). Unlike the commercially exploited chrysotile asbestos, LA has never been used commercially on a wide scale, and, for the mine's operating life; it was considered a byproduct of little or no value. The commercially exploited vermiculite was used in a variety of products, including insulation and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

The vermiculite ore was mined using standard strip mining techniques and conventional mining equipment. The ore was then processed in an onsite dry mill to remove waste rock and overburden material. Once processed, the ore was transported from the mine to the former screening plant, which sorted the ore into five size ranges. After the sorting process, the material was shipped to various locations across the United States, for either direct inclusion in products or for "expansion" prior to use in products. Expansion (also known as "exfoliation" or "popping") was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 degrees Fahrenheit (°F). This process explosively vaporizes the water contained within the phyllosilicate structure causing the vermiculite to expand by a factor of 10 to 15. This produces the vermiculite material most commonly sold as soil conditioner for gardens and greenhouses.

In Libby, operations handling this material occurred at four main locations: the mine and mill located on Rainy Creek Road on top of Zonolite Mountain; the former screening plant and railroad loading station located at the intersection of Highway 37 and Rainy Creek Road and directly across the Kootenai River, respectively; the former

expansion/export plant (the former export plant) located immediately west of Highway 37 where it crosses the Kootenai River; and at the former expansion plant located at the end of Lincoln Road, near 5th Street (Figure 1-2 of the RAWP). The Lincoln Road expansion plant went off line sometime in the early 1950s. Investigations are underway to determine the exact location of this facility.

In 1963, the W.R. Grace Company (Grace) purchased Zonolite and continued vermiculite-mining operations in a similar fashion. In 1975, a wet milling process was added that operated in tandem with the dry mill until the dry mill was taken off line in 1985. The wet milling process was added to reduce dust generation during the milling process. Expansion operations at the former export plant ceased in Libby sometime prior to 1981 although this area was still used to bag and export milled ore until mining operations were stopped in 1990. Before the mine closed in 1990, Libby produced about 80 percent of the world's supply of vermiculite.

Since 1999, the U.S. Environmental Protection Agency Region VIII (EPA) has been conducting sampling and cleanup activities to address highly contaminated areas in the Libby Valley. The EPA investigation was initiated in response to media articles, which detailed extensive asbestos-related health problems in the Libby population. While at first the situation was thought limited to those with direct or indirect occupational exposures, it soon became clear that there were multiple exposure pathways and many persons with no link to mining-related activities were affected.

Typically, the amphibole asbestos contamination found in the Libby Valley comes from one or some combination of "primary" sources: vermiculite mining wastes, vermiculite ores, vermiculite processing wastes, bulk residuals from vermiculite processing, "LA-containing rocks," or Libby vermiculite attic insulation. Asbestos from these primary sources has been found in interior building dust samples and local soils, which in turn act as secondary sources. To date, the goal of EPA has been to find and identify areas with elevated levels of asbestos (the primary sources) and to remove them. EPA has conducted contaminated soil removals at the former export plant location, the former screening plant and adjacent properties, and several residential properties with asbestos source materials present. Three schools in the Libby school system have also had removals performed. Details of these operations can be found in the applicable action memorandums, filed at the information center in Libby.

Cleanup work in Libby is proceeding with the removal of previously identified primary outdoor source areas and the removal of VCI from buildings in the Libby Valley is ongoing. The remedial investigation is ongoing and continues to identify properties that require cleanup.

For long-term management purposes, the Libby asbestos site has been divided into two OUs: OU3, which represents the former mine and Rainy Creek Road, and OU4, which represents the remainder of the Libby Valley. This RASAP has been prepared to address cleanup activities associated with OU4 only. Plans for the work associated with OU3 are expected in the near future.

Section 3
Sampling Strategy, Locations, and Rationale

Sections 3 and 4 comprise the FSP. This section describes the overall strategy, location, and rationale for the sampling conducted during cleanup activities.

3.1 Sampling Strategy

Sampling during cleanup of the residential, commercial, and industrial properties includes confirmation soil and air sampling, air monitoring sampling, and personal breathing zone sampling. The following sections describe the strategy for each type of sampling.

3.1.1 Confirmation Soil and Confirmation (Clearance) Air Sampling

Following the excavation of contaminated soils within the established excavation areas of each property, the CDM onsite representative will inspect the sidewalls and bottom of each excavation. If there is vermiculite in large quantities still visible in the excavation, the cleanup/construction contractor will be directed to remove additional contaminated soil until, in the judgment of the CDM onsite representative; the remaining soils are expected to meet soil clearance criteria. At that point, the CDM onsite representative will collect confirmation soil samples to verify that the soil meets the criteria.

Each confirmation soil sample will consist of a five-point composite (five sub-samples submitted as one sample) surface (0 to 2 inches) soil sample covering an area where contaminated soil has been removed. In some cases, a single grab sample will suffice as a confirmation sample. It will be at the discretion of the CDM onsite representative to decide how many samples will characterize the area being excavated. The number of confirmation soil samples collected daily will be dictated by the size of the excavation and progress of the cleanup/construction contractor.

Final confirmation (clearance) air samples will be collected in areas in which VCI has been removed from the interior of a structure. These areas include attic, knee walls, and wall spaces. Final clearance air samples will be collected after the area has passed visual inspection by an accredited Asbestos Hazardous Emergency Response Act (AHERA) asbestos inspector. If the area requires encapsulation, final clearance air samples will be collected after the encapsulant has been applied and adequately dried. A minimum of 13 samples are collected for final clearance sampling, including: 5 abatement area samples (inside exclusion zone), 5 ambient samples (outside exclusion zone), 2 field blanks, and 1 sealed blank.

3.1.2 Air Monitoring Sampling

During contaminated soil removal, the perimeter of the exclusion zone will be monitored for asbestos fiber migration by collecting stationary air samples at the exclusion zone boundaries. The number and location of the perimeter monitors placed along the exclusion zone boundary will be determined by field personnel after the exclusion zone fencing has been installed by the cleanup/construction contractor. In general, one air sampling location will be located on each side of the excavation for a total of four perimeter-monitoring locations.

3.1.3 Personal Breathing Zone Sampling

Personal BZ air samples will be collected on personnel conducting contaminated soil removal to document that the level of respiratory protection is adequate for the task being conducted. Sampling frequencies for personal BZ air monitoring were established using task-based personal BZ sampling data collected during the 2002 and 2003 field seasons in Libby as follows:

- VCI Removal Sites:
  - Personal VCI removal air samples: 1/week (*not 1 per site per week)* (PCM)
  - Demolition Activities: 1/week (*not 1 per site per week)* (PCM)
  - Wet wiping/HEPA vacuuming: 1 personal air sample every six months (PCM)
  - Detailing Attics: 1 personal air sample every six months (PCM)

- Excavation Sites:
  - Personal air samples (PCM): 1/week (*not 1 per site per week)*
  - A monthly personal air sampling schedule, is to be as follows:
    - Laborer - 2/month
    - Water Hose Operator- 1/month
    - Excavator Operator- 1/month
  - Haul Truck Drivers: 1 personal air sample every six months
  - CDM oversight (collecting soil samples): 1 personal air sample every six months

3.2 Quality Assurance/Quality Control (QC) Samples

Due to the immediate need for sample results, field quality control samples (e.g., duplicates, equipment blanks) for confirmation soil samples are not required to be collected under the removal action program. However, at the discretion of the EPA onsite representative, polarized light microscopy (PLM) data may be substantiated by additional analytical methods, which are currently being developed by EPA in a performance evaluation study. In addition, the precision and accuracy of laboratory analytical techniques and equipment are measured via the laboratory's quality control program. Laboratory systems audits are performed regularly by independent EPA contractors, as well as National Voluntary Laboratory Accreditation Program personnel.

Following receipt at the onsite analytical laboratory, soil confirmation samples will be thoroughly homogenized then split. One sample split will be analyzed by the laboratory and the other returned under strict chain of custody to CDM for archive

purposes, in the Helena office.

Field personnel will collect two types of QC samples: lot blanks and field blanks.

Lot blanks are prepared by submitting unused cassettes for analyses to ensure the lot has not been contaminated prior to use. Lot blanks will be collected and analyzed at a frequency of 2 per 100 cassettes from the same lot. Lot blanks will be analyzed by both NIOSH 7400 and TEM AHERA before the lot of cassettes is used to collect air samples. If the lot is proved to be contaminated with 2 or more fibers per cubic centimeter by NIOSH 7400, or 1 or more LA structures per square millimeter by TEM AHERA, then the lot of cassettes will be discarded and a new lot of cassettes will be used.

Each field team member will collect one field blank per day of air sampling. These field blanks will come from the same lot as the cassettes used for air sample collection. Field blanks will be collected by removing the cap from the sample cassette at the time of sampling for not more than 30 seconds and replacing it. One field blank will be analyzed per week to evaluate air sample collection techniques. The field blank to be analyzed will be selected at the discretion of the sample coordinator so that each field team member's sampling techniques are evaluated periodically. The field blank results will be averaged and subtracted from the analytical results before reporting. Any samples represented by a field blank having a result in excess of the detection limit will be rejected.

For confirmation air sampling, each sample group submitted for analysis will include a minimum of two field blanks. One of these blanks will be analyzed and the other archived. The field blank results will be averaged and subtracted from the analytical results before reporting. Any samples represented by a field blank having a result in excess of the detection limit will be rejected.

Section 4
Field Activity Methods and Procedures

The following is a summary of field activities that will be or have been performed by CDM personnel for removal action sampling:

- Mobilization
- Procurement of equipment and supplies
- Documentation of field activities
- Maintenance and calibration of field instruments and equipment
- Photographic documentation
- Soil and air sampling
- Decontamination of sampling equipment

4.1 Mobilization

Prior to the mobilization for field activities, a field planning meeting was conducted by the CDM project manager (PM) and attended by the field staff and a member of the CDM QA staff. The agenda was reviewed and approved by the QA staff and the health and safety officer prior to the meeting. The meeting briefly discussed and clarified:

- Objectives and scope of the fieldwork
- Equipment and training needs
- Field operating procedures, schedules of events, and individual assignments
- Required QC measures
- Health and safety requirements
- Documents governing fieldwork that must be on site
- Any changes in the field plan documents

A written agenda, reviewed by the CDM QA staff, was distributed and an attendance list signed. Copies of these documents are maintained in the project files, in the Helena office. Additional meetings will be held when the documents governing fieldwork require it or when the scope of the assignment changes significantly.

The field team personnel will and/or have performed the following activities before and during field activities, as applicable:

- Review and understand the FSP, QAPP, and health and safety plan (HASP)
- Ensure that all sample analyses are scheduled through the onsite laboratory
- Obtain required sample containers and other supplies
- Locate hospital
- Obtain and check field sampling equipment
- Obtain personal protective equipment (PPE)
- Turn samples with chain of custody over to the sample coordinator

4.2 Equipment, Supplies, and Sample Containers

The following equipment will be required for sampling activities:

- Potable water/distilled water
- Field logbooks
- Indelible ink pens
- Camera and film
- Sample containers
- Sample paperwork and sample tags/labels
- Custody seals and chain of custody forms
- Nylon-fiber strapping tape
- Duct tape
- Clear tape
- Plastic 2-gallon baggies (zipper-top)
- Non-phosphate containing soap
- Garbage bags
- Paper towels
- Scrub brushes

- Coolers
- Bubble wrap
- Air sampling equipment
- Soil sampling equipment (e.g. plastic trowels or scoops)
- Garden sprayers
- PPE

4.3 Field Documentation

Information and notations will be recorded as required in the applicable field logbook in accordance with CDM 's standard operating procedure (SOP) 4-1, Field Logbook Content and Control (Appendix A of the RAWP).

4.4 Field Instrument and Equipment Calibration and Maintenance

No field measurements will be collected during this investigation and, therefore, no field instruments will be used. Air sampling is conducted using field equipment that must be calibrated and maintained in accordance with equipment manual guidelines.

4.5 Photographic Documentation

Photographs will be taken at each sample location and at any place that the field sampling personnel determine necessary. These photographs will be taken in accordance with CDM's SOP 4-2, Photographic Documentation of Field Activities with modification (Appendix A of the RAWP).

4.6 Field Sampling Methods and Procedures

This section provides brief summaries of SOPs and additional site-specific detail that may not be discussed in the SOPs. The site-specific procedure will be followed during this investigation. For additional information, field personnel will refer to the SOPs included in Appendix A of the RAWP. The HASP should be consulted to determine health and safety protocols for performing site work. Prior to initiating field activities, the field team will review and discuss, in detail, the RASAP and HASP.

The SOPs and site-specific procedures included in Appendix A of the RAWP are listed below (CDM 2002):

- Confirmation Soil Sampling Procedures
- Surface Soil Sampling (Modified SOP 1-3)

- Sample Custody (SOP 1-2)
- Packaging and Shipping of Environmental Samples (SOP 2-1)
- Guide to Handling of Investigation-Derived Waste (Modified SOP 2-2)
- Field Logbook Content and Control (SOP 4-1)
- Photographic Documentation of Field Activities (Modified SOP 4-2)
- Field Equipment Decontamination at Non-Radioactive Sites (Modified SOP 4-5)
- EPA Guidelines (SOP 2008) - General Air Sampling

4.7 Decontamination Procedures

Sampling methods have been selected to reduce the amount of equipment that needs to be decontaminated (i.e., by choosing disposable items). If a piece of equipment needs to be used to collect more than one sample (i.e., comes into contact with more than one sample material), that piece of equipment will be decontaminated between uses in accordance with CDM SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites with modification (Appendix A of the RAWP). Any disposable equipment or, other investigate derived wastes will be handled in accordance with, CDM SOP 2-2, Guide to Handling of Investigation-Derived Waste (Appendix A of the RAWP).

Part II: Quality Assurance Project Plan

Section 5
Project Management

This RASAP supports the draft RAWP for the Libby site. The QAPP (Sections 5-8) was prepared in accordance with EPA *Requirements for Quality Assurance Project Plans for Environmental Data Operations*, QA/R-5, Final (EPA 2001). This section covers the basic area of project management, including the project organization, background and purpose, project description, quality objectives and criteria, special training, and documentation and records. Appendix A of the RAWP includes a copy of applicable CDM SOPs (CDM 2002) and other applicable procedures.

5.1 Project Organization

Organization and responsibilities specific to this study are discussed in this section. CDM will provide the necessary technical and field staff to perform sampling and reporting aspects of the project. Analytical services are provided through EMSL Analytical Laboratory, the CDM onsite subcontract laboratory.

5.1.1 EPA Region VIII and Volpe Management

The EPA remedial project manager (RPM), Mr. Jim Christiansen, is EPA's primary contact for coordinating draft response action work at the Libby Asbestos Site. Mr. Christiansen is responsible for the management and coordination of the following activities:

- Defining the scope of the draft response action
- Defining data quality objectives
- Reviewing all project deliverables
- Maintaining communications with the Volpe project manager for updates on the status of the draft response action activities

The Volpe PM, Mr. John McGuiggin, is Volpe's primary contact for coordinating draft response action work at the Libby asbestos site. Mr. McGuiggin and Ms. Courtney Zamora, Volpe's site manager, are responsible for the management and coordination of the following activities:

- Defining the sampling scope for this investigation
- Defining data quality objectives
- Reviewing all project deliverables
- Reviewing monthly status reports

- Providing oversight of the sampling
- Assuring that plans are implemented properly
- Informing personnel of any special considerations associated with the project
- Providing site access, if necessary
- Reviewing work progress for each task
- Reviewing and analyzing overall performance with respect to goals and objectives

5.1.2 CDM Management

The CDM management team is comprised of the following positions: Libby PM, field construction manager, construction oversight manager, construction oversight staff, sample coordinator, field health and safety coordinator, air monitoring manager, and project quality assurance coordinator.

The following personnel are assigned to this project:

Project Manager	Tim Wall
Field Construction Manager	Scott Supernaugh
Construction Oversight Staff	Tom Vanderweel
	Dean Kozlowski
	Brian Pyles
Sample Coordinator	Terry Crowell
Field Health and Safety Coordinator	Shawn Oliveira
Air Monitoring Manager	Greg Parana
Quality Assurance Manager	George DeLullo
Project Quality Assurance Coordinator	Krista Lippoldt

The CDM PM for this investigation sampling is Tim Wall. Mr. Wall is responsible for the overall management and coordination of the following activities:

- Maintaining communications with EPA and Volpe regarding the status of this project
- Supervising production and review of deliverables
- Reviewing analytical results

- Tracking of planned budgets and schedules
- Incorporating and informing EPA and Volpe of changes in the RAWP, RASAP, HASP, and other project documents
- Procuring non-laboratory subcontractors, when necessary
- Providing oversight of data management
- Notifying the responsible QA staff immediately of significant problems affecting the quality of data or the ability to meet project objectives
- Using sampling data in site remediation decision making

The CDM construction manger for this investigation sampling is Mr. Scott Supernaugh. Mr. Supernaugh is responsible for the overall management and coordination of the following activities:

- Preparing monthly status reports
- Reviewing analytical results
- Overseeing operation and maintenance activities
- Notifying the PM and responsible QA staff immediately of significant problems affecting the quality of data or the ability to meet project objectives
- Scheduling personnel and material resources
- Implementing sampling and analysis aspects of the cleanup, including this RASAP and other project documents
- Organizing and conducting periodic meetings with onsite facility personnel
- Implementing the QC measures specified in CDM 's Quality Assurance Manual (CDM, 2002) (CDM 2002b), this QAPP, and other project documents
- Implementing corrective actions resulting from staff observations, QA/QC surveillances, and/or QA audits
- Providing oversight of daily and periodic report preparation
- Coordinating work activities including sampling
- Ensuring that sampling is conducted in accordance with pertinent CDM SOPs and that the quantity and location of all samples meet the requirements of this RASAP
- Scheduling and conducting required sampling and monitoring activities

Ms. Terry Crowell is the sample coordinator for all laboratory work. Ms. Crowell is responsible for the following:

- Maintaining proper chain-of-custody forms and sample labels for proper transfer of the samples to the analytical laboratories
- Preparing and shipping samples to the analytical laboratories
- Maintaining sampling equipment

Ms. Terry Crowell will receive the data directly from the laboratories. CDM will provide a QA/QC review of the field data package, ensuring that the data, with backup instrument calibration and standard information, is included.

The construction oversight personnel, Mr. Tom Vanderweel, Mr. Dean Kozlowski, and Mr. Brian Pyles, will conduct soil sampling. The air-monitoring manager, Mr. Greg Parana, will conduct air sampling as per the RAWP and this RASAP.

The field health and safety coordinator is Shawn Oliveira. All work will be conducted in accordance with the site-specific HASP that governs the field activities outlined in this RASAP. Mr. Oliveira, as the field health and safety coordinator, is responsible for ensuring that the protocols specified in the HASP are carried out during field activities. He will also ensure that copies of the HASP are maintained at the site at all times. He is responsible for the upgrading or downgrading of the level of protection in accordance with the HASP, based on the existing site conditions. The field health and safety coordinator has conducted an initial health and safety meeting, providing an overview of the HASP to all assigned field personnel, and has had them sign a form to indicate they understand the content of the HASP document and will adhere to its specifications. He will contact the CDM health and safety manager, Charles Myers, if any questions or issues arise during field activities.

5.1.3 Quality Assurance Organization

CDM's QA manager, Mr. George DeLullo, implements the QA program. The QA manager is independent of the technical staff and reports directly to the president of CDM on QA matters. The QA manager thus has the authority to objectively review projects and identify problems and the authority to use corporate resources as necessary to resolve any quality-related problems.

The QA coordinator for this project, Ms. Krista Lippoldt, reports to the QA manager on QA matters. Under the oversight of the QA manager, she is responsible for the following:

- Verifying that corrective actions resulting from staff observations, QA/QC surveillances, and/or QA audits are implemented
- Reviewing and approving the project-specific plans

- Directing the overall project QA program
- Maintaining QA oversight of the project
- Reviewing QA sections in project reports, as applicable
- Reviewing QA/QC procedures applicable to this project
- Initiating, reviewing, and following up on response actions, as necessary
- Consulting with the CDM QA manager, as needed, on appropriate QA/QC measures and corrective actions
- Conducting internal global audits to obtain uniform use of appropriate QA/QC measures, if applicable
- Arranging performance audits of measurement activities, as necessary
- Providing monthly written reports on QA/QC activity to the CDM QA manager

5.2 Background and Purpose

Site background and history are provided in Section 2 of this RASAP. The purpose and objectives of these sampling and analysis efforts are discussed in Section 1.1 of this RASAP. The purpose of this RASAP is to provide guidance to ensure that all environmentally related data collection procedures and measurements are scientifically sound and of known, acceptable, and documented quality and conducted in accordance with the requirements of the project.

5.3 Project Description

A description of this project is provided in Section 1 of this RASAP. Samples will be analyzed for parameters listed in Section 5.4.2.4. Sampling activities and all associated procedures are described in detail in this RASAP.

5.4 Quality Objectives and Criteria for Measurement

This section provides internal means for control and review of the project so that environmentally related measurements and data collected are of known and acceptable quality. The subsections below describe the data quality objectives (DQOs) (Section 5.4.1) and data measurement objectives (Section 5.4.2).

5.4.1 Data Quality Objectives

The DQO process is a series of planning steps based on scientific methods that are designed to ensure that the type, quantity, and quality of environmental data used in decision- making are appropriate for the intended purpose. EPA has issued guidelines to help data users develop site-specific DQOs (EPA 2000). The DQO process is intended to:

- Clarify the study objective
- Define the most appropriate type of data to collect
- Determine the most appropriate conditions from which to collect the data
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the design

The goal of the DQO process is to "help assure that data of sufficient quality are obtained to support remedial response decisions, reduce overall costs of data sampling and analysis activities, and accelerate project planning and implementation."

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The process also ensures that the resources required to generate the data are justified. The DQO process consists of seven steps, and the output from each step influences the choices that will be made later in the process. These steps include:

Step 1: State the problem

Step 2: Identify the decision

Step 3: Identify the inputs to the decision

Step 4: Define the study boundaries

Step 5: Develop a decision rule

Step 6: Specify tolerable limits on decision errors

Step 7: Optimize the design

During the first six steps of the process, the planning team develops decision performance criteria (i.e., DQOs) that were used to develop the data collection design. The final step of the process involves developing the data collection design based on the DQOs. A brief discussion of these steps and their application to the removal action sampling are provided below.

5.4.1.1 Step 1: State the Problem

Identify the planning team members including decision makers:

All project personnel are detailed in Section 5.1. The decision makers for the activities described in this RASAP are Jim Christiansen (EPA RPM), John McGuiggin (Volpe PM), and Tim Wall (CDM PM).

Describe the problem:

Removal activities are performed at residential and commercial properties that are known to contain LA asbestos-contaminated VCI, interior dust, and exterior soils. Perimeter air monitoring samples are collected during exterior contaminated soil removals.

Confirmation samples, both air and soil, are collected once all contamination has been removed from the property. Soil confirmation samples are collected once all contaminated soil has been removed. Confirmation (clearance) air samples are collected once bulk VCI and/or interior dust. Depending on the analytical results, the area of concern (i.e., property where removal action occurred) is either re-cleaned or de-regulated (i.e., designated as a non-contaminated area).

During intrusive work on these properties (i.e., excavation of contaminated soil), the potential for LA fibers to migrate offsite increases. Engineer controls, such as applying a water spray, are employed to minimize the release of LA fibers to adjacent properties. To determine the effectiveness of the engineering controls, monitoring air samples are collected. Monitoring air samples are collected along the north, south, east, and west boundaries of the exclusion zone and analyzed for LA asbestos. Detectable amounts of LA asbestos in monitoring air samples indicate that engineering controls and work practices need to be re-evaluated and/or adjusted.

During cleanup activities, personal BZ air samples are collected from workers for health and safety purposes, to ensure they use appropriate level of protection.

Determine resources:

CDM's current task order under Volpe, provides a detailed description of resources, budget, and schedule for sampling and analysis for response activities.

5.4.1.2 Step 2: Identify the Decision

Identify the principle study question and alternative actions:

Contaminated Soil Removal Clearance Samples:

Principle Study Question:

Is LA asbestos detected on the soil surface of the excavated area, after soil removal?

Alternative Actions:

1. Excavate additional soils

2. Stop excavation and designate as a non-contaminated area

Air Confirmation Samples for VCI Removal:

Principle Study Question:

Is LA asbestos detected within a negative pressure enclosure (NPE) after removal for areas that contained VCI prior to removal activities?

Alternative Actions:

1. Re-clean space NPE
2. Take no action

Air Confirmation Samples for Interior Dust Removal:

Principle Study Question:

Is LA asbestos detected within a NPE after removal that was contaminated with LA asbestos dust, prior to removal activities?

Alternative Actions:

1. Re-clean space NPE
2. Take no action

Monitoring Air Samples:

Principle Study Question:

Are there levels of LA asbestos detected along the perimeter boundary of an exterior cleanup site?

Alternative Actions:

1. Continue contaminated soil removal and re-evaluate engineering controls and work practices
2. Take no action

Personal BZ Air Samples

Principle Study Question:

Is LA asbestos detected in the workers' breathing zone above the action levels detailed in the HASP?

Alternative Actions:

1. Continue contaminated soil and/or VCI removal and re-evaluate engineering controls and work practices

2. Stop work

3. Take no action

Decision Statements

Soil Confirmation Samples:

Does contaminated soil remain after excavation activities are complete? If yes, then, additional soils will be excavated. If no, the area will be de-regulated and deemed non-contaminated.

Air Confirmation Samples for VCI Removal:

Does the space that previously contained VCI contain LA asbestos, after removal activities? If yes, the area will be re-cleaned. If no, the area will be de-regulated and deemed non-contaminated.

Air Confirmation Samples for Interior Dust Removal:

Does the space that was previously contaminated with LA asbestos fibers remain contaminated, with asbestos? If yes, the area will be re-cleaned. If no, the area will be de-regulated and deemed non-contaminated.

Monitoring Air Samples:

Are LA fibers migrating to the exclusion zone boundary during LA contaminated soil removal? If yes, engineering controls and work practices will be re-evaluated and/or work will stop. If no, excavation activities will continue with no additional evaluation.

Personal BZ Air Samples:

Are LA asbestos fibers collecting in the workers' breathing zone above the action levels identified in the HASP? If yes, engineering controls and work practices will be re-evaluated and/or work will stop. If no, cleanup activities will continue with no additional evaluation.

5.4.1.3 Step 3: Identify the Inputs to the Decision

Identify the information needed:

For confirmation, monitoring, and BZ and air samples, the concentration (structures per cubic centimeter [S/cm]^3) of LA asbestos is needed to make a decision. For confirmation and monitoring air samples, a minimum of 1,200 liters (L) of air must be collected in order to meet the requirement as described in the analytical method. For personal BZ air samples, a minimum of 25 L of air must be collected in order to meet the requirement as described in the analytical method.

For soil confirmation samples, the concentration (percent [%]) of LA asbestos in the remaining surface (of the excavation) soil is needed to make a decision.

For soil clearance samples, approximately 2 kilograms (kg) of soil must be collected in order to meet the requirement as described in the analytical method and archive sample.

Determine the basis for determining the Action Levels:

All action levels were established by the EPA.

Identify sampling and analysis methods that can meet the data requirements:

Confirmation, monitoring, and personal BZ air samples and:

All air samples are analyzed by transmission electron microscopy (TEM) [National Institute of Occupational Safety and Health (NIOSH) 1994a] using the counting method as described in the Asbestos Hazard Emergency Response Act (AHERA) (EPA 1987).

Soil Samples:

All soil samples are prepared and homogenized, in the onsite laboratory (*non-grinding method*) and analyzed by PLM (NIOSH 1994b).

5.4.1.4 Step 4: Define the Boundaries of the Study

Define the target population

Soil Confirmation Samples:

The surface soil at the bottom of the excavation after soil removal activities.

Air Confirmation Samples for VCI Removal:

Ambient air within the space that contained VCI, prior to VCI removal.

Air Confirmation Samples for Interior Dust Removal:

Ambient air within the living or functional space that was contaminated with LA asbestos, prior to removal activities.

Monitoring Air Samples:

Ambient air within the boundary of the exclusion zone.

Personal BZ Air Samples:

Ambient air within the worker's breathing zone, during removal activities.

Spatial Boundaries:

Soil Confirmation Samples:

The vertical spatial boundaries for soil confirmation samples extend from approximately 18 inches below ground surface (bgs) to the ground surface. The horizontal spatial boundaries for soil confirmation samples include all areas encompassed by the entire site-specific exclusion zone

Air Confirmation Samples for VCI Removal:

The vertical spatial boundaries for VCI removal air confirmation samples extend from the floor surface to the ceiling of the functional space that contained VCI, prior to removal. The horizontal spatial boundaries for VCI removal air confirmation samples include all areas encompassed by walls in the functional space that contained VCI, prior to removal.

Air Confirmation Samples for Interior Dust Removal:

The vertical spatial boundaries for interior cleaning air confirmation samples extend from the floor surface to the ceiling of the living or functional space that was contaminated with LA, prior to removal. The horizontal spatial boundaries for interior cleaning air confirmation samples include all areas encompassed by the walls in the living or functional space that was contaminated with LA, prior to removal.

Monitoring Air Samples:

The vertical spatial boundaries for perimeter air samples extend from the ground surface to the height of the air sample cartridge (4-6 ft). The horizontal spatial boundaries for the perimeter air samples encompass the entire site-specific exclusion zone.

Personal BZ Air Samples:

The vertical and horizontal spatial boundaries for personal air samples are each individual worker's breathing zone.

Timeframe for collecting samples:

Soil Confirmation Samples:

Contaminated soil removal clearance samples will be cleaned after all contaminated soil has been excavated and removed from the site, until the area is designated non-contaminated.

Air Confirmation Samples for VCI Removal

VCI removal air clearance samples will be collected after all VCI has been removed

from the functional space that contained VCI, until the area is designated non-contaminated.

Air Confirmation Samples for Interior Dust Removal:

Interior cleaning clearance samples will be collected after the functional or living space that was contaminated with LA has been cleaned, and until the area is designated non-contaminated.

Monitoring Air Samples:

Monitoring air samples will only be collected during exterior removal activities (i.e., excavation).

Personal BZ Air Samples:

Personal air samples will only be collected during exterior or interior removal activities (i.e., excavation, VCI removal, interior cleaning).

Potential Constraints:

Soil Confirmation Samples:

The only potential constraint for collecting contaminated soil clearance samples is if there is no soil at the bottom of the excavation (excavating to bedrock).

Air Confirmation Samples for VCI Removal:

Air confirmation samples must always be collected after VCI and interior dust removal.

Monitoring Air Samples:

Potential constraints for collecting monitoring air samples may include inaccessibility (due to property boundaries) or inclement weather (rain/moisture can cause the sample to be void).

Personal BZ Air Samples:

BZ samples should always be collected when appropriate.

Smallest Subpopulation:

Soil Confirmation Samples:

One soil sample per excavated area measuring approximately 250 square feet.

Air Confirmation Samples for VCI Removal:

Five air samples (cartridges)

Air Confirmation Samples for Interior Dust Removal:

Five air samples (cartridges)

Monitoring Air Samples:

Four air samples (cartridges)

Personal BZ Air Samples

One air sample for each work activity per week.

5.4.1.5 Step 5: Develop a Decision Rule

Population Parameter:

Contaminated Soil Removal Clearance Samples:

Soil sample representing the area of excavation, per 250 square feet.

Air Confirmation Samples for VCI Removal

Sum of all 5 VCI clearance air samples collected.

Air Confirmation Samples for Interior Dust Removal:

Total of all 4 clearance air samples collected.

Monitoring Air Samples:

Total of all 4 monitoring air samples collected.

Personal BZ Air Samples

Air sample result representing the breathing zone of the worker being monitored.

Action Levels:

Soil Confirmation Samples:

If excavation does not extend to the default depths (18 inches for specific use areas and 12 inches for yard/driveway areas), the action level is nondetect. If excavation does extend to the aforementioned default depths, the action level is less than (<) 1 %.

Air Confirmation Samples for VCI Removal

The action level is at least 5 LA fibers per 5 samples collected, per area.

Air Confirmation Samples for Interior Dust Removal:

The action level is any detectable LA fiber.

Monitoring Air Samples:

The action level is any detectable LA fiber.

Personal BZ Air Samples

The action levels are found in the Comprehensive Site Health and Safety Plan (CDM 2001) and any addenda thereto.

Decision Rule:

Soil Confirmation Samples:

For excavations less than the default depth if the confirmation soil sample collected from the bottom of excavation has detectable LA asbestos, an additional 6 inches will be excavated at the discretion of the CDM oversight representative. If the confirmation soil sample collected from the area of excavation reveals no detectable LA asbestos (i.e., nondetect), then excavation will stop.

Air Confirmation Samples for VCI Removal:

If more than five LA fibers are detected in the five VCI clearance air samples, then the functional space will be re-cleaned and subsequently re-sampled. If 5 or less LA fibers are detected in the 5 VCI clearance samples, then the functional space will be de-regulated and the area will be designated non-contaminated (i.e. clean).

Air Confirmation Samples for Interior Dust Removal:

If any LA fibers are detected in any of the five interior cleaning clearance samples, then the living or functional space will be re-cleaned. If all of all 5 interior cleaning clearance samples are nondetect, then the functional space will be de-regulated and the area will be designated non-contaminated (i.e. clean).

Monitoring Air Samples:

If any LA fibers are detected in any of the four monitoring air samples, then excavation engineering controls and work practices will be re-evaluated and/or work will be stopped. If all of all four perimeter air samples are nondetect, then no action will be taken.

For excavation at or exceeding the default depths, if the confirmation soil sample collected from the area of excavation has LA asbestos of 1 % or greater, an additional 6 inches will be excavated at the discretion of the CDM oversight representative. If the confirmation soil sample collected from the area of excavation has less than 1 %

LA asbestos, then excavating will stop.

Personal BZ air samples:

Action levels and resulting actions to be taken are found in the Comprehensive Site Health and Safety Plan (CDM 2001).

5.4.1.6 Step 6: Specify Tolerable Limits on Decision Errors

Null hypotheses:

Soil Confirmation Samples:

The soils below an excavation are still contaminated with LA asbestos, after removal.

Air Confirmation Samples for VCI Removal

The functional space that contained VCI prior to removal is contaminated with LA asbestos, after removal.

Air confirmation Samples for Interior Dust Removal:

The living or functional space that was previously contaminated with LA asbestos is contaminated with LA asbestos, after removal.

Monitoring Air Samples:

The perimeter air is contaminated with LA asbestos.

Personal BZ Air Samples

The BZ air is contaminated with LA asbestos above the action levels, listed in the HASP

The alternative hypotheses are the opposite of the null hypotheses.

Consequences of making an incorrect decision:

Type I error: A Type I error occurs when the null hypothesis is rejected (accepts alternative hypothesis) when it is actually true.

Type II error: A Type II error occurs when the null hypothesis is accepted (rejects alternative) when is actually false.

Type I errors have more serious consequences and, the ability for making Type I errors should be minimized.

Monitoring Air Samples:

Type I error: A Type I error would result in determining that the perimeter air is not contaminated with LA asbestos when it is. This results in an increased risk to human health.

Type II error: A Type II error would result in determining that the perimeter air is contaminated with LA asbestos when it is not. This results in re-evaluating engineering controls (possibly stopping work) when it was not necessary.

Air Confirmation Samples for VCI Removal

Type I error: A Type I error would result in determining that the NPE that previously contained VCI is not contaminated with LA asbestos when it is. This results in an increased risk to human health.

Type II error: A Type II error would result in determining that the NPE that previously contained VCI is contaminated with LA asbestos when it is not. This results in unnecessary re-cleaning of the NPE when it is not necessary and therefore costs are accumulated unnecessarily.

Air Confirmation samples for Interior Dust Removal:

Type I error: A Type I error would result in determining that the NPE that was previously contaminated with LA asbestos dust is not contaminated when it is. This results in an increased risk to human health.

Type II error: A Type II error would result in determining that the NPE that was previously contaminated with LA asbestos dust is still contaminated when it is actually not. This results in unnecessary re-cleaning of the NPE when it is not necessary and therefore costs are accumulated unnecessarily.

Soil Confirmation Samples:

Type I error: A Type I error would result in determining that the surface soils in the bottom of the excavated area is not contaminated with LA asbestos when it is. This results in an increased risk to human health.

Type II error: A Type II error would result in determining that the surface soils in the bottom of the excavated area is still contaminated with LA asbestos when it is not. This results in excavation additional soils when it was not necessary and, therefore costs are accumulated unnecessarily.

Personal BZ Air Samples

Type I error: A Type I error would result in determining that the BZ air is not contaminated with LA asbestos above the action levels when it actually is. This results in an increased risk to human health.

Type II error: A Type II error would result in determining that the BZ air is

contaminated with LA asbestos above the action level when it is not. This results in re-evaluating engineering controls (possibly stopping work) or increasing the level of protection of protection when it was not necessary.

Gray region:

There are no gray regions.

Tolerable limits:

There are no tolerable limits. Decisions are based on actual data (i.e., no +/- %)and there are no acceptable ranges above action levels.

5.4.1.7 Step 7: Optimize the Design for Obtaining Data

The DQOs have been evaluated and used to design the field methods and procedures. This will ensure that the DQOs will be met and scientifically sound data will be collected.

5.4.2 Data Measurement Objectives

Every reasonable attempt will be made to obtain a complete set of usable data. If a result cannot be obtained or is rejected for any reason, the effect of the missing data will be evaluated by CDM. In addition, the FSP provides guidance to ensure that the samples obtained are representative of the media at the site.

5.4.2.1 Quality Assurance Guidance

The field QA program has been designed in accordance with CDM's QA Manual (2002b), EPA's Guidance for the DQO Process (EPA 2000), and the EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA 2001).

5.4.2.2 Precision, Accuracy, Representativeness, Completeness, and Comparability Criteria

Precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters are indicators of data quality. PARCC goals are established for this investigation to aid in assessing data quality. The following paragraphs define these PARCC parameters in conjunction with this project.

Precision. The precision of a measurement is an expression of mutual agreement among individual measurements of the same property taken under prescribed similar conditions. Precision is quantitative and most often expressed in terms of relative percent difference (RPD). Precision of reported results is a function of inherent field-related variability plus laboratory analytical variability, depending on the type of QC samples. Contribution of laboratory-related sources to overall variability will be measured through various laboratory QC samples. The RPD can be calculated for each pair of duplicate analyses using the following equation:

$$RPD = S - D/[(S + D)/2] \times 100$$

Where:

S = First sample value (original value)
D = Second sample value (duplicate value)

Accuracy. Accuracy is the degree of agreement of a measurement with an accepted reference or true value and can be used as a measure of the bias in a system (i.e., if all results are biased in the same direction). Accuracy is quantitative and usually expressed as the percent recovery (%R) of a sample result. The %R is calculated as follows:

$$\%R = SSR - SR / SA \times 100$$

Where:

SSR = Spiked sample result
SR = Sample result
SA = Spike added

Ideally, it is desirable that the reported concentration equals the actual concentration present in the sample. Analytical data can be evaluated for accuracy using spiked samples (e.g., matrix spikes [MSs] and laboratory control samples [LCSs]).

Representativeness. Representativeness expresses the degree to which sample data represent:

- The characteristic being measured
- Parameter variations at a sampling point
- An environmental condition

Representativeness is a qualitative and quantitative parameter that is concerned with the proper design of the sample plan, sampling procedures, and the absence of sample contamination. Acceptable representativeness will be achieved through (1) careful, informed selection of sampling locations, (2) selection of testing parameters and methods that adequately define and characterize the extent of possible contamination and meet the required parameter reporting limits, (3) proper collecting and handling of samples to avoid interferences and prevent contamination and loss, and (4) collection of a sufficient number of samples to allow characterization. Representativeness is a consideration that will be employed during all sample location and collection efforts. The representativeness can be assessed qualitatively by reviewing the procedures and design of the sampling event and quantitatively by reviewing the blank samples. Review of blank samples consists of averaging, the field blank results and subtracting from the analytical results before reporting. Any samples represented by a field blank having a result in excess of the detection limit will be rejected.

Completeness. Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions. Usability will be determined by evaluation of the PARCC parameters excluding completeness. Those data that are evaluated and not rejected are usable. Completeness will be calculated after data validation. A completeness goal of 90 percent is projected for the data set collected for the activities at the Site. If the completeness goal of 90 percent is not met, additional sampling will be ongoing until it adequately achieves project objectives. Completeness is calculated using the following equation:

$$\% \text{ Completeness} = (DO/DP) \times 100$$

Where:

DO = Data obtained and usable
DP = Data planned to be obtained

Comparability. Comparability is a qualitative parameter. Consistency in the acquisition, handling, and analysis of samples is necessary for comparison of results. Data developed under this investigation will be collected and analyzed using EPA-approved analytical methods and QC measures to ensure comparability of results with other analyses performed in a similar manner.

Sensitivity. Sensitivity, although not a PARCC parameter, will be evaluated for this project. The achievement of acceptable reporting limits depends on instrument sensitivity and matrix effects. Therefore, it is important for the laboratories to monitor the sensitivity of data-gathering instruments to ensure good data quality through constant instrument performance. Instrument sensitivity will be monitored by the laboratories through the analysis of preparation blanks. CDM will evaluate sensitivity during the entire project by ensuring that reporting limits are at or below the project required reporting limits. Reporting limits are included in Table 5-1 (Appendix A of the RAWP).

5.4.2.3 Field Measurements

No field measurements will be performed during this investigation. However, air sampling will be conducted. Therefore, air sampling equipment will require calibration. The air sampling equipment will be calibrated in accordance with equipment guidelines and manuals.

5.4.2.4 Laboratory Analysis

Samples collected under this QAPP will be analyzed for parameters listed below using methods in parentheses. The analytical methods are as follows:

- PLM - Bulk Asbestos (NIOSH 9002)
- PCM - Asbestos and Other Fibers (NIOSH 7400)

- Interim Transmission Electron Microscopy Analytical Methods (AHERA TEM)

Samples will be submitted to CDM's onsite subcontract laboratories. Prior to shipping samples, sampling personnel will ensure that the laboratories are ready to receive and analyze samples, can provide necessary data packages, and can provide an electronic copy of the data. The laboratories will submit analytical data reports to CDM. The data reports will contain a case narrative that briefly describes the number of samples, the analyses, and any noteworthy analytical difficulties or QA/QC issues associated with the submitted samples. The data report will also include signed chain-of-custody forms, cooler receipt forms, analytical data, and a QC package. The laboratories will provide an electronic copy of the data to CDM.

Reporting Limits

The reporting limits provided in Table 5-1 are the minimum levels that the laboratories will report without a qualifier. It is therefore important for the laboratories to monitor the sensitivity of data-gathering instruments to ensure data quality through constant instrument performance checks.

Holding Times and Preservation

Holding times are storage times allowed between sample collection and sample analysis (and extraction) when the designated preservation and storage techniques are employed. There are no required holding times for asbestos.

Quality Control Analyses

Project analytical laboratories will follow all laboratory QC requirements as outlined in their respective statements of work, or in the handbook of laboratory analytical methods and references (EPA 2003), as applicable. Laboratory QC may be measured by the preparation and analysis of laboratory duplicates, MSs, LCSs, and/or laboratory blanks (i.e., preparation blanks), or by visual verification or other controls consistent with national standardized laboratory operation programs (e.g., National Voluntary Laboratory Accreditation Program criteria).

5.5 Special Training Requirements

Special training required for this study include the following:

- Health and safety training, as described in the HASP, including 40 hour Occupational Safety and Health Administration (OSHA) and 8 hour refresher training

- Asbestos Inspector Training

5.6 Documentation and Records

The laboratories will submit the sample data packages as hard copy and electronic version (pdf) to the CDM laboratory coordinator as required by the CDM subcontract with the laboratory. An electronic data deliverable (EDD) will also be provided to the

CDM laboratory and sample coordinators.

CDM's administrative staff in Helena has the responsibility for maintenance of records. The CDM laboratory coordinator will provide hard copy laboratory reports to Helena for inclusion in the project file. Project personnel are responsible for project documents in their possession while working on a particular task. Field logbook(s) will be filed in the project files in Helena. Documentation describing changes to approved plans, if they occur, will be included in the project files.

Section 6
Measurement and Data Acquisition

This section covers sample process design, sampling methods requirements, handling and custody, analytical methods, QC, equipment maintenance, supply acceptance, and data management. The field procedures are designed so that the following occurs:

- Samples collected are consistent with project objectives
- Samples are collected in a manner so that data represent actual conditions

6.1 Sample Process Design

The general goal of the sampling is to provide information regarding soil confirmation, air confirmation, interior dust removal, air monitoring, and personal air BZ during and after soil excavation and VCI removal at the Libby site. The sample process design is discussed in Section 3 of this RASAP.

6.2 Sampling Methods Requirements

Sampling methods, sample containers, and overall field management are described below.

6.2.1 Sampling Equipment and Preparation

Equipment required for the field investigation for sampling, health and safety, documentation, and decontamination is presented in sections 4.2 through 4.3 of this RASAP.

Field preparatory activities are discussed in Section 4 of the FSP.

6.2.2 Sample Containers

Sample containers required for this field investigation will consist of a 25 mm phase contrast microscopy for the air samples and a 1-gallon zip lock plastic bag for the soil samples.

6.2.3 Sample Collection, Handling, and Shipment

Samples collected during the study consist of air, soil and QC samples. All sample collection procedures are outlined in Section 4 of this RASAP, SOPs, and procedures included in appendices of the RAWP. The SOPs applicable to this investigation are provided in Appendix A of the RAWP. QC samples will also be collected, handled, and shipped in accordance with these procedures.

6.3 Sample Handling and Custody Requirements

Custody and documentation for field and laboratory work are described below,

followed by a discussion of corrections to documentation.

6.3.1 Sample Handling and Field Custody Procedures

This section describes sample labeling, field custody procedures, and sample handling.

6.3.1.1 Sample Labeling and Identification

A unique alphanumeric code will identify each sample collected during sampling events (as specified in SOP 1-2, Sample Custody [Appendix A]). The coding system will provide a tracking record to allow retrieval of information about a particular sample and to ensure that each sample is uniquely identified. Sample numbers will correlate with locations to be sampled. The sample locations and numbers will be identified in the field logbooks.

Soil and air samples will be labeled with index identification numbers supplied and maintained by the sample coordinator, and signed out by sampling teams. Sample index identification numbers will identify the samples collected during the removal activities by having the following format:

2R-#####

Where:

2R	=	Removal activity samples collected in accordance with this SAP
#####	=	A sequential five digit number

Labels will be used in accordance with SOP 1-2, Sample Custody (Appendix A) for CDM subcontract laboratory samples. Sample labels and/or tags will be completed and affixed to the appropriate sample containers. Preprinted adhesive labels may be used. These labels will be secured with waterproof tape if necessary.

6.3.1.2 Chain-of-Custody Requirements

Chain-of-custody procedures and sample shipment will follow the requirements stated in CDM's SOP 1-2, Sample Custody, and SOP 2-1, Packaging and Shipping of Environmental Samples with EPA-approved modifications (Appendix A), for samples sent to CDM subcontract laboratories. The chain-of-custody record is employed as physical evidence of sample custody and control. This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A completed chain-of-custody record is required to accompany each shipment of samples.

6.3.1.3 Sample Packaging and Shipping

Samples will be packaged and shipped in accordance with SOP 2-1, Packaging and Shipping of Environmental Samples with EPA-approved modifications (see Appendix A) for samples sent to CDM subcontract laboratories. These samples will be placed in a plastic bag and then in a cooler with ice and held at 4 plus or minus (±) 2 degrees

Celsius (°C), if required. Custody seals will be placed over at least two sides of the cooler and secured by tape if custody is released to a non-sampler. All samples will be picked up by a courier, delivered to the laboratory, or shipped by an overnight delivery service to the designated laboratories, as necessary.

6.3.1.4 Field Logbook and Records

Field logbooks will be maintained in accordance with SOP 4-1, Logbook Content and Control (Appendix A). The log is an accounting of activities at the site and will duly note problems or deviations from the governing plans and observations relating to the sampling and analysis program. The Libby file coordinator will maintain the logbook(s) and will send copies of the field logbook(s) to the project file in Helena weekly.

6.3.2 Laboratory Custody Procedures and Documentation

Laboratory custody procedures are provided in the laboratories' QA management plan for all laboratories. Upon receipt at the onsite laboratories, each sample shipment will be inspected to assess the condition of the shipping cooler and the individual samples. This inspection will include measuring the temperature, if applicable, of the cooler to document that the temperature of the samples is within the acceptable criteria (4 +/- 2°C) and verifying sample integrity. The enclosed chain-of-custody records will be cross-referenced with all of the samples in the shipment. These records will be signed by the laboratory sample custodian and copies will be provided to CDM in the laboratory report. The sample custodian will continue the chain-of-custody record process by using the chain-of-custody records number on each sample on receipt. It is the laboratory's responsibility to maintain internal logbooks and records throughout sample preparation, analysis, data reporting, and disposal.

6.3.3 Corrections to and Deviations from Documentation

Documentation modification requirements for field logbook entries are described in SOP 4-1, Field Logbook Content and Control (Appendix A of the RAWP). For the logbooks, a single strikeout, initialed and dated, is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry.

All deviations from the guiding documents will be recorded in field logbooks. In addition, any major deviations to field sampling procedures will be documented on a Record of Deviation/Request for Modification Form, which will undergo review by the Volpe Technical Lead or designate and the EPA RPM or designate prior to implementation of field changes. Any modifications to chain-of-custody forms will be made on the sample coordinator copy of the form and faxed to the analytical laboratory for documentation purposes.

6.4 Analytical Methods Requirements

The laboratory QA program and analytical methods are addressed below.

6.4.1 Laboratory Quality Assurance Program

Samples collected during this project will be analyzed in accordance with standard EPA and/or nationally recognized analytical procedures. The purpose of using standard procedures is to provide analytical data of known quality and consistency. Analytical laboratories will adhere to QC requirements as established the analytical method used.

6.4.2 Methods

The methods to be used for asbestos analysis are presented in Section 5.4.2.4.

6.5 Quality Control Requirements

Field, laboratory, and internal office QC are discussed below.

6.5.1 Field Quality Control Samples

6.5.1.1 Soil

Due to the time-critical need to receive soil confirmation sampling results, field QC samples will not be collected. However, disposable field sampling equipment will be used whenever possible. Nondisposable equipment will be decontaminated following each use in accordance with the procedures outlined in CDM SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites, with modification (Appendix A).

6.5.1.2 Air

Field personnel will collect two types of QC samples: lot blanks and field blanks.

Lot blanks are prepared by submitting unused cassettes for analyses to ensure the lot has not been contaminated prior to use. Lot blanks will be collected and analyzed at a frequency of 2 per 100 cassettes from the same lot. Lot blanks will be analyzed by both NIOSH 7400 and TEM AHERA before the lot of cassettes is used to collect air samples. If the lot is proved to be contaminated with 2 or more fibers per cubic centimeter by NIOSH 7400, or 1 or more LA structures per square millimeter by TEM AHERA, then the lot of cassettes will be discarded and a new lot of cassettes will be used.

Each field team member will collect one field blank per day of air sampling. These field blanks will come from the same lot as the cassettes used for air sample collection. Field blanks will be collected by removing the cap from the sample cassette at the time of sampling for not more than 30 seconds and replacing it. One field blank will be analyzed per week to evaluate air sample collection techniques. The field blank to be analyzed will be selected at the discretion of the sample coordinator so that each field team member's sampling techniques are evaluated periodically. The field blank results will be averaged and subtracted from the analytical results before reporting. Any samples represented by a field blank having a result in excess of the detection limit will be rejected.

For confirmation air sampling, each sample group submitted for analysis will include a minimum of two field blanks. One of these blanks will be analyzed and the other archived. The field blank results will be averaged and subtracted from the analytical results before reporting. Any samples represented by a field blank having a result in excess of the detection limit will be rejected.

6.5.2 Laboratory Quality Control

Project analytical laboratories will follow all laboratory QC requirements as outlined in their respective statements of work, or in the handbook of laboratory analytical methods and references (EPA 2003), as applicable. Laboratory QC may be measured by the preparation and analysis of laboratory duplicates, MSs, LCSs, and/or laboratory blanks (i.e., preparation blanks), or by visual verification or other controls consistent with national standardized laboratory operation programs (e.g., National Voluntary Laboratory Accreditation Program criteria).

6.5.2.1 Laboratory Internal Quality Control Samples

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination. Each type of laboratory-based QC sample will be analyzed at a rate of 5 percent, or one per batch (a batch is a group of up to 20 samples analyzed together), whichever is more frequent. Results of the QC analysis will be included in the QC package, and QC samples may consist of laboratory duplicates, and laboratory blanks, whichever is applicable, and any other method-required QC samples.

Laboratory blank samples will be analyzed to assess possible contamination so that corrective measures may be taken, if necessary. Laboratory duplicate samples are aliquots of a single sample that are split on arrival at the laboratory or upon analysis. Results obtained for two replicates that are split in a controlled laboratory environment are used to assess laboratory precision of the analysis. All laboratory QC procedures are outlined in the Libby Asbestos Project Analytical Guidance Documents (2003).

6.5.2.2 Laboratory Quality Control Checks

The laboratories will perform the QC checks required by each analytical method.

6.5.3 Internal Quality Control Checks

Internal QC checks will be conducted throughout the project to evaluate the performance of the project team during data generation. All internal QC will be conducted in accordance with the applicable procedures listed below:

- All project deliverables will receive technical and QA reviews prior to being issued to EPA and/or Volpe in any form.
- Completed review forms will be maintained in the project files.
- Corrective action of any deficiencies is the responsibility of the PM, with assistance from the QA staff, if necessary.

6.6 Equipment Maintenance Procedures

All field and laboratory equipment will be maintained in accordance with the manufacturers' maintenance and operating procedures.

6.7 Instrument Calibration Procedures and Frequency

Calibration of field and laboratory instruments is addressed in the following subsections.

6.7.1 Field Instruments

No field measurements are conducted during this investigation. However, air sampling is being conducted. Therefore, air sampling equipment requires calibration. The air sampling equipment will be calibrated in accordance with equipment guidelines and manuals. Records of initial calibration, continuing calibration, repair, and/or replacement of air sampling equipment will be filed and maintained by the air monitoring manager.

6.7.2 Laboratory Instruments

Calibration of laboratory instruments will be based on written procedures approved by laboratory management and included in the laboratory's QA manual. Instruments and equipment will be initially calibrated and continuously calibrated at required intervals as specified by either the manufacturer or more updated requirements (e.g., methodology requirements). Calibration standards used as reference standards will be traceable to EPA, National Institute of Standards and Technology, or another nationally recognized reference standard source.

Records of initial calibration, continuing calibration, repair, and/or replacement of laboratory equipment will be filed and maintained by the laboratories. Calibration records will be filed and maintained at the laboratories' location where the work is performed and may be required to be included in data reporting packages.

6.8 Acceptance Requirements for Supplies

Prior to acceptance, all supplies and consumables will be inspected by the site coordinator to ensure that they are in satisfactory condition and free of defects.

6.9 Nondirect Measurement Data Acquisition Requirements

Nondirect measurement data include information from previous sampling events. The acceptance criteria for such data include a review by someone other than the author. Any measurement data included in information from the above sources (i.e., previous sampling event) will determine further action at the site only to the extent that those data can be verified by project staff.

6.10 Data Management

Analytical results are maintained in the Libby version 2 secured project database. Hard copy data reports will be maintained in the project files in the CDM Helena office.

Section 7
Assessment and Oversight

Assessments and oversight reports to management are necessary to ensure that procedures are followed as required and that deviations from procedures are documented. These reports also serve to keep management current on field activities. Assessment and oversight reports are discussed below.

7.1 Assessments and Response Actions

Assessments and corresponding response actions are discussed below.

7.1.1 Assessments

Performance assessments are quantitative checks on the quality of a measurement system and are appropriate to analytical work. Performance assessments for the laboratories may be accomplished by submitting reference material as blind reference (or performance evaluation) samples. These assessment samples are samples with known concentrations that are submitted to the laboratories without informing the laboratories of the known concentration or that they are performance samples. Samples will be provided to the laboratories for performance assessment upon request from the EPA RPM or Volpe PM. Laboratory audits may also be conducted upon request from the EPA RPM or Volpe PM.

System assessments are qualitative reviews of different aspects of project work to check on the use of appropriate QC measures and the functioning of the QA system. Any determination or changes for project assessments will be performed under the direction of the QA manager, who reports directly to the CDM president. Quality Procedure 6.2, as defined in the CDM QA Manual (CDM 2002), defines CDM 's corporate assessments, procedures, and requirements. Due to the amount of sampling and the duration of the project, both a field audit and an office audit are scheduled for the site annually.

7.1.2 Response Actions

Response actions will be implemented on a case-by-case basis to correct quality problems. Minor response actions taken in the field to immediately correct a quality problem will be documented in the applicable field logbook and a verbal report will be provided to the CDM PM. For verbal reports, the CDM PM will complete a communication log to document that response actions were relayed to him. Major response actions taken in the field will be approved by the CDM PM, the EPA RPM, and Volpe PM prior to implementation of the change. Major response actions are those that may affect the quality or objective of the investigation. Quality problems that cannot be corrected quickly through routine procedures may require implementation of a corrective action request (CAR) form.

All formal response actions will be submitted to either CDM 's QA manager and/or project QA coordinator for review and issuance. CDM 's PM or local QA coordinator will notify the QA manager when quality problems arise that may require a formal response action. CAR forms will be completed according to Quality Procedure 8.1 of the CDM QA Manual (CDM 2002).

7.2 Reports to Management

QA reports will be provided to management whenever quality problems are encountered. Field staff will note any quality problems on field data sheets, or in field logbooks. CDM 's PM will inform the project QA coordinator upon encountering quality issues that cannot be immediately corrected. Weekly reports and change request forms are not required for this work assignment. Monthly QA reports will be submitted to CDM 's QA manager by the project QA coordinator.

Topics to be summarized regularly may include but not be limited to:

- Document technical and QA reviews that have been conducted
- Activities and general program status
- Project meetings
- Corrective action activities
- Any unresolved problem
- Any significant QA/QC problems not included above

Section 8
Data Validation and Usability

Laboratory results will be reviewed for compliance with project objectives. Data validation and evaluation are discussed in Sections 8.1 and 8.2, respectively.

8.1 Data Review, Validation, and Verification Requirements

Due to the real-time usage of air monitoring and confirmation soil sampling results, no formal data validation for these media is currently required of CDM. However, data is reviewed daily by the field health and safety coordinator and the sample coordinator to ensure data (e.g., sampling dates and sample volumes, as appropriate) are reported correctly by the analytical laboratory. In addition, data packages are reviewed for completeness prior to distribution.

At the request of Volpe, CDM will validate data submitted by analytical laboratories. Data validation consists of examining the sample data package(s) against pre-determined standardized requirements. The validator may examine, as appropriate, the reported results, QC summaries, case narratives, chain-of-custody information, raw data, LCS/LCSDs, MS/MSDs, initial and continuing instrument calibration, and other reported information to determine the accuracy and completeness of the data package. During this process, the validator will verify that the analytical methodologies were followed and QC requirements were met. The validator may recalculate selected analytical results to verify the accuracy of the reported information. Analytical results will then be qualified as necessary.

Data verification includes checking that results have been transferred correctly from laboratory data printouts to the laboratory report and to the EDD. Data verification for this project is primarily performed as a function of built-in quality control checks in the Libby project database when data is uploaded. However, the sample coordinator will notify the laboratories and the project database manager (Mr. Mark Raney, Volpe) of any discrepancies found during data usage.

8.2 Reconciliation with Data Quality Objectives

Once data has been generated, CDM evaluates data to determine if DQOs were achieved. This achievement will be discussed in the measurement report, including the data and any deviations to this RASAP. Sample data will be maintained in a Microsoft Access database. Laboratory QC sample data will be stored in hard copy (in the project files) and in a separate database.

Section 9
References

CDM. 2003. Draft Response Action Work Plan. July.

_____. 2002. Technical Standard Operating Procedures Manual. Revision 16. December.

_____. 2001. Comprehensive Site Health and Safety Program for the Initial Emergency Response Action, Libby, Montana, Revision1. May.

EPA. 2003. Libby Asbestos Project Analytical Guidance for Asbestos Laboratory. August.

_____. 2001. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, QA/R-5, Final.

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NIOSH. 1994. Asbestos (bulk) by PLM Method 9002, Issue 2. August.